PORTABLE TELEPHONE SET, KEY OPERATION VALIDITY/INVALIDITY NOTIFICATION METHOD FOR USE WITH THE PORTABLE TELEPHONE SET AND PROGRAM FOR THE METHOD

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a technique for notifying a user of a portable telephone set of whether a key operation of the portable telephone set is valid or invalid.

Description of the Related Art

Conventionally, when a portable telephone set is operated, if the operation is an invalid key operation, then usually the operation is ignored. Therefore, the user does not have any measures for clearly finding out that the key operation performed is invalid.

Japanese Patent Laid-Open No. 2002-163063 (hereinafter referred to as patent document 1) discloses, particularly on pages 2 to 5 and in FIGS. 1 to 3, an apparatus wherein a set of light emitting diodes for individually illuminating ten keys and a menu key are disposed on the back side of a key sheet which includes the keys on an operation section thereof such that only those of the light emitting diodes which correspond to those keys which can be depressed validly are lit.

The apparatus can indicate a key or keys which can be depressed validly to a user thereof to provide a guidance for a key operation to the user. The apparatus can thereby assist

the user to perform an appropriate operation of the menu key and the ten keys of the operation section and prevent a wrong wasteful operation arising from depression of an invalid key thereby to improve the convenience in use.

5   With the conventional apparatus which indicates a key operation as described above, since only a light emitting diode or diodes corresponding to a key or keys which can be depressed validly are lit, an error can be prevented. However, when a depressed key is invalid, the apparatus cannot notify the user

10   of the invalidity of the depressed key. Further, although a light emitting diode originally exhibits high power consumption, such light emitting diodes are disposed in a corresponding relationship to the keys, and those light emitting diodes corresponding to all of valid ones of the keys are lit. Besides,

15   depression waiting time, for example, for 15 seconds is provided for the lit light emitting diodes, and if none of the valid keys is depressed within the depression waiting time, then the light emitting diodes are kept to emit light for the period of time. Therefore, the apparatus is disadvantageous in that

20   the power consumption thereof or exhaustion of a battery used is high.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a

25   portable telephone set, a key operation validity/invalidity notification method for use with the portable telephone set

and a program for the method wherein, when depression of a key
is performed actually, a notification of whether the depressed
key is a valid key or an invalid key can be issued readily without
the necessity for special hardware.

5   In order to attain the object described above, according
to an aspect of the present invention, there is provided a
portable telephone set, comprising call termination
notification means for notifying a user of the portable telephone
set of termination of a telephone call, key inputting means

10   including a plurality of keys for accepting a key inputting
operation of any of the keys by the user, key input discrimination
means for discriminating whether the key inputting operation
of the key inputting means is valid or invalid, key input validity
notification means operable when the key input discrimination

15   means discriminates that the key inputting operation is valid
for causing the call termination notification means to notify
the user of the validity of the key inputting operation with
a first pattern set in advance, and key input invalidity
notification means operable when the key input discrimination

20   means discriminates that the key inputting operation is invalid
for causing the call termination notification means to notify
the user of the invalidity of the key inputting operation with
a second pattern set in advance and different from the first
pattern.

25   The call termination notification means may include at
least one of a speaker, a vibrator, a liquid crystal display

device, a liquid crystal display backlight and a key backlight.

At least one of the vibrator, liquid crystal display device, liquid crystal display backlight and key backlight of the call termination notification means may be rendered operative when the portable telephone set is used in a mode wherein no sound is generated from the portable telephone set.

In a preferred form, the portable telephone set further comprises a memory for storing key allocation information representative of whether each of the keys is valid or invalid when a selected menu is to be processed, the key input discrimination means using the key allocation information to discriminate whether the key inputting operation is valid or invalid.

According to another aspect of the present invention, there is provided a key operation validity/invalidity notification method for a portable telephone set which includes call termination notification means for notifying a user of the portable telephone set of termination of a telephone call and key inputting means including a plurality of keys for accepting a key inputting operation of any of the keys by the user, comprising a key input discrimination step of discriminating whether the key inputting operation of the key inputting means is valid or invalid, and a key input validity/invalidity notification step of causing, when it is discriminated that the key inputting operation is valid, the call termination notification means to notify the user of the

validity of the key inputting operation with a first pattern set in advance but causing, when it is discriminated that the key inputting operation is invalid, the call termination notification means to notify the user of the invalidity of the key inputting operation with a second pattern set in advance and different from the first pattern.

According to a further aspect of the present invention, there is provided a program for a portable telephone set which includes call termination notification means for notifying a user of the portable telephone set of termination of a telephone call and key inputting means including a plurality of keys for accepting a key inputting operation of any of the keys by the user, the program causing a computer to execute the steps of discriminating whether the key inputting operation of the key inputting means is valid or invalid, and causing, when it is discriminated that the key inputting operation is valid, the call termination notification means to notify the user of the validity of the key inputting operation with a first pattern set in advance, but causing, when it is discriminated that the key inputting operation is invalid, the call termination notification means to notify the user of the invalidity of the key inputting operation with a second pattern set in advance and different from the first pattern.

With the portable telephone set, key operation validity/invalidity notification method for a portable telephone set and program according to the present invention,

when depression of one of the keys is performed actually, a notification of whether the key is a valid key or an invalid key can be issued to a user of the portable telephone set readily with low power consumption without the requirement for special hardware.

The above and other objects, features and advantages of the present invention will become apparent from the following description and the appended claims, taken in conjunction with the accompanying drawings in which like parts or elements are denoted by like reference symbols.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing a configuration of a portable telephone set to which the present invention is applied;

FIG. 2 is a flow chart illustrating operation of the portable telephone set of FIG. 1; and

FIGS. 3 and 4 are flow charts illustrating different operation of the portable telephone set of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, there is shown in block diagram a configuration of a portable telephone set to which the present invention is applied. The portable telephone set 1 shown includes a radio section 11, a base band section 12, a voice processing section 13, a display section 14, a control section 15, a key sheet 16, a speaker 17, a vibrator 18, and a memory

19.

The display section 14 is a liquid crystal display (LCD) unit and includes an LCD backlight 141 for illumination thereof, and the key sheet 16 includes a key backlight 161 for illumination thereof. LEDs (Light Emitting Diodes) are used for the backlights.

The memory 19 stores key allocation information 191 and a menu 192 as well as a program (not shown) to be executed by the control section 15, that is, a program which can be executed by a computer. The menu 192 is a table of functions of the portable telephone set, and every time a valid key is inputted, the control section 15 refers to the menu 192 to update the key allocation information 191. The key allocation information 191 is formed as a list representing whether the individual keys of the key sheet 16 are valid or invalid.

If one of the keys of the key sheet 16 is depressed and a corresponding signal is inputted to the control section 15, then the control section 15 refers to the key allocation information 191 to detect whether the key is valid or invalid. If the inputted key is valid, then the control section 15 controls the speaker 17 to generate first beep sound (BEEP#1) and performs a predetermined process. On the other hand, if the inputted key is invalid, then the control section 15 controls the speaker 17 to generate second beep sound (BEEP#2) different from the first beep sound (BEEP#1) and waits until a valid key is inputted.

FIG. 2 is a flow chart illustrating operation of the

portable telephone set 1 of FIG. 1. Operation of the portable telephone set 1 described above is described below with reference to FIGS. 1 and 2. It is to be noted that the process illustrated in FIG. 2 is realized by the control section 15 executing the program of the memory 19.

If the power supply to the portable telephone set 1 is turned on, then allocation of keys of an initial menu (waiting screen) is performed automatically (step S1 of FIG. 2). Then, if an input of a key on the key sheet 16 is detected (step S2 of FIG. 2), then the control section 15 refers to the key allocation information 191 to discriminate whether or not the key is valid (step S3 of FIG. 2).

If the inputted key is valid, then the control section 15 controls the speaker 17 to generate the first beep sound (BEEP#1) (step S5 of FIG. 2). Then, if the key is not the power supply key (step S6 of FIG. 2), then the control section 15 performs a predetermined process (step S7 of FIG. 2). Then, if the hierarchy of the menu changes as a result of the process (step S10 of FIG. 2), then the processing returns to step S1 to update the key allocation information 191.

On the other hand, if the inputted key is the power supply key (step S6 of FIG. 2), then the control section 15 performs a different operation depending upon a period of time for which the key is depressed. If the period of time within which the key is depressed is, for example, within one second (step S8 of FIG. 2), then the control section 15 restores the waiting

screen (step S9 of FIG. 2) and the processing returns to step S1, but if the period within which the key is depressed is equal to or longer than 1 second (step S8 of FIG. 2), then the control section 15 turns off the power supply and ends the processing.

5   On the other hand, if the inputted key is valid (step S3 of FIG. 2), then the control section 15 controls the speaker 17 to generate the second beep sound (BEEP#2) different from the first beep sound (BEEP#1) (step S4 of FIG. 2) and then waits until a valid key operation is inputted.

10   In this manner, in the portable telephone set 1, if an inputted key is valid, then the first beep sound (BEEP#1) is generated, but if the inputted key is invalid, then the second beep sound (BEEP#2) is generated. Consequently, the user can discriminate readily whether the inputted key is valid or invalid,

15 and accordingly, the portable telephone set can prevent the user from performing a wrong key operation repetitively. In this instance, since the speaker 17 which is a call termination notification element provided in the portable telephone set 1 is used also as a key operation validity/invalidity

20 notification element, there is no necessity to use special hardware for notification of whether a key operation is valid or invalid.

      FIGS. 3 and 4 are flow charts illustrating different operation of the portable telephone set 1 described above with

25 reference to FIG. 1. The process illustrated in FIGS. 3 and 4 is realized by the control section 15 executing the program

of the memory 19 similarly.

Referring to FIGS. 1, 3 and 4, if the power supply to the portable telephone set 1 is turned on, then allocation of the keys of an initial menu (waiting screen) is performed automatically (step S11 of FIG. 3), and it is discriminated whether or not the portable telephone set 1 currently is in a state wherein it does not output a sound signal (a state wherein the terminal itself is used in a soundless fashion, that is, a manner mode) (step S12 of FIG. 3). If the portable telephone set 1 is not in the manner mode, then it performs operation similar to that of the operation described hereinabove with reference to FIG. 2 (steps S13 to S21 of FIG. 3).

On the other hand, if the portable telephone set 1 is in the manner mode, then when an input of a key on the key sheet 16 is detected (step S22 of FIG. 4), the control section 15 refers to the key allocation information 191 to discriminate whether the key is valid or invalid (step S23 of FIG. 4).

If the inputted key is valid, then the control section 15 controls the vibrator 18 to generate vibration in a first vibration pattern #1 or controls at least one of the LCD backlight 141 and the key backlight 161 to emit light in a first color change pattern #1 of blinking (step S25 of FIG. 4). Then, if the key is not the power supply key (step S25 of FIG. 4), then the control section 15 performs a predetermined process (step S27 of FIG. 4). Then, if the hierarchy of the menu changes as a result of the process (step S30 of FIG. 4), then the control

section 15 returns the processing to step S11, at which it updates the key allocation information 191.

On the other hand, if the inputted key is the power supply key (step S26 of FIG. 4), then the control section 15 performs a different operation depending upon the period of time for which the key is depressed. If the period for which the key is depressed is within 1 second (step S28 of FIG. 4), then the control section 15 restores the waiting screen (step S29 of FIG. 4) and the processing returns to step S11, but if the period of time for which the key is depressed is equal to or longer than 1 second (step S28 of FIG. 4), then the control section 15 turns off the power supply and ends the processing.

On the other hand, if the inputted key is invalid (step S23 of FIG. 4), then the control section 15 controls the vibrator 18 to generate vibration in the second vibration pattern #2 different from the first vibration pattern #1 or controls at least one of the LCD backlight 141 and key backlight 161 to emit light in the second color variation pattern #2 of blinking different from the first color variation pattern #1 (step S24 of FIG. 4). Then, the control section 15 waits until a valid key operation is inputted.

In this manner, according to the operation illustrated in FIGS. 3 and 4, if an inputted key when the portable telephone set 1 is in any other mode than the manner mode is valid, then the first beep sound (BEEP#1) is emitted, but if the inputted key is invalid, then the second beep sound (BEEP#2) is emitted.

On the other hand, if the key inputted when the portable telephone set 1 is in the manner mode is valid, then at least one of the first vibration pattern #1 and the first color variation pattern #1 is used to generate vibration or emit light, but if the inputted key is invalid, then at least one of the second vibration pattern #2 and the second color variation pattern #2 is used to generate vibration or emit light. Consequently, the user can discriminate readily whether the inputted key is valid or invalid. Therefore, the portable telephone set can prevent the user from performing a wrong key operation repetitively.

In this instance, since some of the vibrator 18, LCD backlight 141, key backlight 161 and so forth provided on the portable telephone set 1 is used as a key operation validity/invalidity notification element, there is no necessity to use special hardware for the notification of validity/invalidity.

It is to be noted that, while, in the operation described above with reference to FIGS. 3 and 4, a key touch tone by the speaker 17 is used as a method of notifying the user of the validity of a key input in any other mode than the manner mode, the validity of a key input can otherwise be indicated by vibration by the vibrator 18, color change by blinking of the LCD backlight 141 or the key backlight 161 or a suitable combination of them.

Where the pattern of vibration by the vibrator 18 is used for the discrimination of whether a key operation is valid or

invalid, it is effective to use the vibrator 18 when the user uses the portable telephone set in the manner mode so that the key touch tone may not be sounded or when the environment is noisy and the key touch tone cannot be noticed readily.

5   Further, in the operation described above with reference to FIGS. 3 and 4, it is also possible to visually notify the user of the validity of a key operation. As one of such methods, the LCD backlight 141 and/or the key backlight 161 are blinked to change the color. While such key operation

10   validity/invalidity notification elements as the speaker 17, vibrator 18, LCD backlight 141 and key backlight 161 are usually used for notification of termination of a call and so forth, they can be customized in accordance with the taste of the user.

          While a preferred embodiment of the present invention

15   has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the following claims.